

# **A Multiwavelength Study of High-Mass Gamma-Ray Binaries**

**Prof. Joel Coley**

**Department of Physics and Astronomy, Howard University**

**Friday, September 19, 2025, 3:30pm**

**Abstract:** In this talk, Prof. Coley will present a multiwavelength overview of High-mass Gamma-ray Binaries (HMGBs), which consist of a compact object and a massive star orbiting their center of mass. Compared to the hundreds of X-ray binaries that are currently known, only nine HMGBs have been firmly identified. While a significant advancement of our understanding of these sources have been witnessed in the last two decades, the high-energy emission is only confirmed to be driven by an intrabinary shock between a rapidly spinning pulsar compact object and the wind of a massive star in only in three HMGBs (PSR B1259-63, PSR J2032+4127 and LS I+61 303). Multiwavelength spectral and timing results of three High-mass Gamma-ray binaries 1FGL J1018.6-5856, LS 5039 and 4FGL J1405.1-6119 will also be presented and the synchrotron and inverse Compton emission driving their high-energy emission will be discussed.

**Bio:** Dr. Joel Barry Coley is a recently tenured Associate Professor (as of August 2024) in the Department of Physics and Astronomy at Howard University in Washington DC. His research focuses a multi-wavelength study of binary star evolution at key phases in their lifetime such as particle acceleration in High-mass Gamma-ray binaries and Millisecond Pulsars as well as accretion in High-mass X-ray binaries. Dr. Coley received his Ph.D. in Physics from the University of Maryland Baltimore County in 2015 and was subsequently a NASA Postdoctoral Fellow (NPP) at NASA Goddard Space Flight Center. Dr. Coley has been a professor at Howard University since 2018.